RHIC Retreat - Controls Session
September 17, 1999

Time Stamping and Data Correlation

What worked well?
- Data correlation within BLM, BPM and permit systems
- Gpm did rough correlations to AGS cycle using arrival time

Problems, Limitations
- Acquisition timestamps not available on most data
- Gpm, loggers unable to correlate most async. data
- Generic MADC ADOs do not support data correlation
- Correlation within the permit system was problematic

Observations, Comments
- Solutions were found for correlating data within a system
- Generic apps (Gpm, logger) have trouble because they attempt to correlate data across systems

Action Items for Next Run
- Finalize plan for providing Timestamps/DC across systems
- Provide acquisition timestamps for target systems
- Update Gpm to retrieve and use acquisition timestamps

Long-Term Work
- Provide data correlation for target systems
- Extend solution to all systems

ADO Communication Tools

What worked well?
- Network throughput was fine, consistent with Dry Run.
- CPU usage was minimal.
- Connections maintained as long as FEC up.

Problems, Limitations
- Connections not maintained across FEC reboot
- Clients not notified when connections go down
- BPM manager could not accept 21 simultaneous FEC conn.
- Occasional file descriptor problems caused apps. to hang

Observations, Comments
System use was consistent with expectations from the Dry Run

Action Items for Next Run
- Maintain connections through FEC reboots
- Fix file descriptor problems

Long-Term Work
Reduce time to setup async requests

FEC Performance and Reliability

What worked well?
- Most FECs performed well and had reasonable reliability for the commissioning run
- Both StartUp and fecreset programs good for diagnostics

Problems, Limitations
- A few FECs crashed often
- A few FECs lose memory continually - leaks?
- Controls was short of replacement CPUs - OK now
- Some false alarms from the system monitor/alarm system
- Some noise on some PS FECs
- Insufficient guarantee of real-time priorities for some tasks

Observations, Comments
- FECs with WFGs were problematic to reboot

Action Items for Next Run
- Develop procedures to track/understand FEC problems
- Fix noise problems on PS FECs
- Reduce work necessary after rebooting an FEC with WFGs
- Understand and try to fix FECs with memory problems

Long-Term Work
- Better understanding of FEC which have no network response

Power Supplies - WFGs, Diagnostic Apps

What worked well?
- To first order the WFGs worked
- PSStatus program was useful
- PET access to WFG, MADC and status/control was good
- Modicon and AB PLC worked fine

Problems, Limitations
- After FEC reboot the startup of the WFGs is a bother
- Hard to know if all WFGs, MADCs, PLCs and PS are working
- Suspected "glitches", that is wfg or interface or power supply not doing what was asked. RTDL related?
- FEC to Modicon to node card communication slow
- WFG manager needs to know more about the WFGs state

Observations, Comments
- The power supply systems got lots of use.
- Power Supply post mortem proved useful but needs development

Action Items for Next Run
- Improve the WFG startup - better parameters, allow turn on outputing a value, cache output
- Errors - glitch detection in WFG, error status reported in ADO, PSStatus read/displays errors, WFG manager uses errors
- System-wide diagnostics for testing WFG and MADCs
- Learn more about FEC to Modicon to node card communication
- More Input from PS group
- Better control, MADC like, of data from the WFG output buffer including time stamp info. and PM file writing

Long-Term Work

Post Mortem

What worked well?
- Prototype pmview application focused on power supply data
- Data storage/display based on event (quench)
- Power supply group found pmview product useful

Problems, Limitations
- Anticipating needs - requirements came late
- Data timestamping and correlation

Observations, Comments
- Lots of communciations between Controls and PS groups
  during the commissioning period

Action Items for Next Run
- Prompt more input from commissioners on needs/timelines
- Create SDDS tools for FECs and make available
- Create generic PM display tools and application
- Above for MADC-based systems, then WFGs

Long-Term Work
- Expand above tools/app. to encompass other systems
- Incorporate PM display in other apps. as needed

Beam Position Monitors

What worked well?
- Bpm manager and ADO worked well together
- Data retrieved reliably from bpms known to be working
- Was able to correlate data from many FECs
- Service mode/sanity check enhanced FEC availability

Problems, Limitations
- Robustness problems due to bad pointers and counters
- Problems establishing async connections from FECs to manager
- Difficult to make channel configuration changes

Observations, Comments
- There was a long shakeout period
- Eventually, people trusted output from bpms
- Bpms used for position, intensity, lifetime, efficiency

Action Items for Next Run
- Configuration issues
- Allow dynamic switching from service to working mode

Long-Term Work
- Mode switching
- Package data differently in ADO parameters?
- Additional ADO parameters?

Beam Loss Monitors

What worked well?
- System usable on day 1
- BLMs, FECs, ADOs, managers, app. - all very reliable
- 3D strip chart a popular addition
- Diagnostic support for manager was popular

Problems, Limitations
- Referencing losses to beam current not available

Observations, Comments
- Weekly BLM meetings were a help in getting system ready
- Integration aided by:
- MADC ADO/hardware well known
- BLM ADOs/managers handled by one person (Don)
- Manager to app. interface defined early
- Save/Restore and Logging available, but not used
- BLM threshold system and app. unused and untested

Action Items for Next Run
- Field-test multibunch support
- Allow optional referencing to beam current

Long-Term Work
- Post-Mortem data display
- Display data with thresholds
- Save/Load display setups
- 10 Hz data

Logging System

What worked well?
- Data successfully logged for vacuum, cryo, FEC memory
- Cryo data used for real-time web data display
- Generic logging available from within applications

Problems, Limitations
- Log data viewers (SDDSplot, guils) difficult to use
- Storing and correlating data collected asynchronously

Observations, Comments
- Users mostly satisfied with web-based cryo displays

Action Items for Next Run
- Create/maintain database of logged data files
- New UI to logged data files
- New plotting display of logged data
- More advertising and training

Long-Term Work
- Logger improvements - array, async, on-change support
- Incorporate logger tools into Gpm
- Log data file management
- Hooks to the alarm system

Alarms

What worked well?
- AlarmSystem performed well - important to the comm. effort.
- Reasonable decisions were made about alarm configuration
  RHIC alarms kept separate from AGS alarms
  Only limited set of alarms directed to alarm screen
- Notifications of PS faults, FEC failures, vac. valve closures
- Logs provide a good history of faults

Problems, Limitations, Observations
- Sometimes there were too many alarms
  e.g. Quench event 'floods', double alarms for PS faults
- Sometimes not enough alarms or failures without alarms
  configuration problems
  no ado alarm support planned for some faults
  some cases under investigation
- AlarmDisplay functionality not utilized by most users
  e.g. details, acknowledging, verifying, masking
- Some FECs didn't follow the rules for masking, severity level

Action Items for Next Run
- Get operations more involved in RHIC alarm management
- Get all FECs up to proper release level
- Review systems and ados. Consider enabling more alarms
- Decide on Power Supply alarm mechanisms (role of PSStatus?)
- Review sources of alarm floods. Consider prevention
- Restore pet popup to the AlarmDisplay program

Long-Term Work
- Alarm name filtering issues (generic vs. system names, filters)
- Develop new AlarmDisplay based on standard UI components
- Consider changes in alarm mask management

MADCs

What worked well?
- MADCs worked
- GPM access of MADC data was useful

Problems, Limitations
- Some hardware issues on noise.
- Virtual scope needed (needs) work.
- System wide management (setup, conversion values, events, ...)
- Still undecided on some basic data flow questions.
- Still undecided on some basic functionality - floats, watching,

Observations, Comments
- More interest in group 1 data, has to share with VirtualScope

Action Items for Next Run
- Configure all 64 group 1 madcCh with aliases
- System wide management tools or application
- Better PM support
- Data correlation support in ADO
- Internals - code to driver
- Decide and maybe redo data flow
- Decide on functionallity

Long-Term Work

Console Hardware

What worked well?
- Reliability and performance of MCR computers was good
- Plotting performance at MCR machines was sufficient
- No indication of network bottlenecks

Problems, Limitations
- X server performance a problem for power supply group
- One X server (sun65) crashed periodically - hardware problem
- WCM display had performance problems in MCR
- Abandoned processes from xterminals

Observations, Comments
- Xterminal comfort displays heavily used
- Monitoring of operational servers (sun68, sun59) indicated no problems with network traffic, CPU, or disk access

Action Items for Next Run
- Fix and re-deploy sun65
- Purchase new X server for power supply group
- One MCR console to get additional 2-head xterminal

Long-Term Work
- Re-evaluate console setups - keyboards, monitors, xterminals
- Find solution to abandoned processes problem

Generic Applications

What worked well?
- Gpm, pet, VirtualScope, Startup all considered very useful
- Gpm monitors, pet pages created/edited by users
- No serious performance/robustness problems

Problems, Limitations
- Gpm, pet - FEC reboots handled poorly
- Gpm - data timstamping, data correlation limited
    some hangs due to communication problems
    sometimes hard to identify item of interest from name
- pet - no ADO descriptions
    data continues to be collected when page is iconified
- VirtualScope - buggy at first - lots of last minute work

Observations, Comments
- Gpm heavily used in MCR, mainly for comfort displays
- pet heavily used in MCR, 1004B (PS)
- VirtualScope found useful by PS group at the end

Action Items for Next Run
- Better handling of FEC reboots
- Gpm - use of data timestamps, improved data correlation
- pet - view/edit ADO descriptions, Gpm-style strip charts
- VirtualScope - continued field testing, usability enhancements

Long-Term Work
- VirtualScope - data storage/retrieval, cursor tracking
- Gpm - new logging and data display options, 3D strip charts
- pet - toggle collection with icon state, searches, page construct

Save/Restore

What worked well?
- Timed archives maintained for entire run with no problems
- Addition of S/R tools to pet provided useful visual comparisions
- S/R sucessfully used within BLM app. for hardware setups

Problems, Limitations
- Hard to find important differences in ArchiveMan comparisons
- S/R of ADO support properties did not work well

Observations, Comments
- Overall use of S/R tools and ArchiveManager app. was limited
- S/R of PS settings done with private Ramp Manager code

Action Items for Next Run
- Provide more useful archive comparisons
- Implement S/R of ADO support properties
- Advertising and training

Long-Term Work
- Improve statistics reports for saves and restores
- Investigate archiving of process data
- Move AGS archiving to new system

Database Management

What worked well?
- Configuration data from database available as needed
- Inventory data available
- A new data browser proved useful

Problems, Limitations
- Inventory database on PC caused updates to be too infrequent
- Some CNS problems loading AGS data
- Some ADO class names too large
- Not all "operational" DB on operation DB servers

Observations, Comments
- Configuration data management was not a bottleneck

Action Items for Next Run
- Move inventory DB to Sybase and provide entry/viewing tools
- Change adoInst table to allow for larger ADO class names
- Look into CNS problem

Long-Term Work

Vacuum, WCM, DCCT

What worked well?
- Overall, all systems performed well

Problems, Limitations
- DCCTs are noisy and have baseline drift
- WCM display could not keep up with data

Observations, Comments
- Vacuum - MCR did not always know when valves were closed

Action Items for Next Run
- Vacuum - Add cryo VJR gauges and 4th processor
- DCCT - add mechanism to automatically rezero
- WCM - add second scope, improve speed of plotting data

Long-Term Work
- Vacuum - add TSP devices
- DCCT - develop Gpm monitor pages as needed

Diagnostic Support

What worked well?
- Diagnostic support representative available 24/7
- Problem routing mechanisms worked

Problems, Limitations
- Not all support personnel are familiar with RHIC systems
- A few apps/managers built and run from private areas
- Diagnostic documentation on many systems unavailable

Observations, Comments
- Many calls resulted from FEC problems
- In many cases, only the system expert could help

Action Items for Next Run
- Better docs. to help users resolve problems on their own
- Continued training of support personnel on RHIC systems
- Improved trouble logging system

Long-Term Work
- Expand the number of diagnostics support personnel

Experiment Support

What worked well?
- CDEV server available to STAR and PHENIX users
- Server provided XF, BLM, WFG, and PS data

Problems, Limitations
- Server crashed on occasion - some problems understood
- CDEV server name conflicts

Observations, Comments
- Experimenters ask lots of the same questions
- CDEV compatibility between groups is important

Action Items for Next Run
- Write FAQ document for experimenters

Long-Term Work
- Expand server to deliver data from sources other than ADOs
- Provide tools for making data available on web pages

Application Development Tools

What worked well?
- UI, plotting, controls and DB tools useful and reliable
- New Gpm, pet, S/R, logging tools

Problems, Limitations
- Some plotting performance problems on slow machines
- People looking for more from beamline display
- More training required for newer tools
- Manager tools need work/testing to resolve FD problems

Observations, Comments
- CDEV became a popular object and client/server interface
- Many tools not used by developers

Action Items for Next Run
- Beamline display enhancements
- Advertising and Training on newer tools
- Improved documentation

Long-Term Work
- Explore Java and Web development tools
- Use of LabView apps. in MCR
- Use of Tcl/Tk

Application Development Environment

What worked well?
- ClearCase a useful development aid
- Library/include file dependencies handled well
- Purify/Quantify are useful tools
- debugger UI (ddd) also useful

Problems, Limitations
- compiler - STL, templates not completely usable
- debugger - problems debugging database programs
- Linking applications is slow
- Versioning of shared objects

Observations, Comments
- Many developer machines now use Linux
- Code now only compiles on Solaris
- Tcl/Tk development

Action Items for Next Run
- Handle shared object versions better
- Reduce link times with new RAID system

Long-Term Work
- Integrate Java into development environment
- Java problems with Xterminals
- Upgrade to latest version of compiler/debugger
- ClearCase on Linux

Permit System

What worked well?
- Pet pages for this system well received by PS group
- System usable and performed as intended

Problems, Limitations
- System initially unstable
- Changes to hardware and ADOs made during the run

Observations, Comments
- System used by PS group for debugging quenches
- Some features like event masking not used this run

Action Items for Next Run
- Finish and test ADO changes made during the last run

Long-Term Work
- Dedicated application?

Controls Hardware Issues

Hardware Reliability
- excellent
- not systematic design problems seend
- failures were less than 1% of installed equipment

VME Chassis
- isolate power supply frame from VME chassis
- all chassis with MADC

All remaining AC reset chassis installed

RTDL data integrity
- problems persisted after RHIC was shutdown
- problem went away when activity was stopped in FEC
- V106 change has eliminated glitch
- distribution system being monitored

Eventlink
- contention problem found in V100
- all units to be reworked

WFG Glitches?
- will be looked at after RTDL system is fixed

Beam Sync Link
- scheme to eliminate problems when RF resets designed
- parts are on order
- design is in drafting
- will be ready for December run

Tom

1. Controls
Tom Clifford
CAD Controls

2. Console Level Computers
- No chronic problems with the Sun systems in general
- But hardware problem with Sun65, slow to find, still not fixed
- Orphaned processes are a problem, no solution in sight.
- Isolated crashes/hangs
- 1004B needed more CPU power, done
- Is MCR layout OK?

3. FEC Reliability
- Some facts for the period 1 Aug. to 15 Aug.
  - Storms on 5 Aug and 11 Aug
- No crashes of the 11 BLM FECs
- 35 of the 42 Alcove PS did not crash
  - But what of the seven
- 7w-ps1 had 36 crashes
- Controls was short of replacement CPUs, OK now

4. FEC Reliability (continue)
- False alarms from the system monitor about FECs
- fecreset and StartUp are good for diagnostics
- But procedures are needed so that "each" FEC problem can be tracked and understood
- Chassis PS noise - Modifying grounds

5. Network and Links
- Network performance was fine
- Security issues are being resolved
- RTDL glitches - Under considerable investigation
- Other links are fine

6. Software Tools
- GUI, AdolF, CDEV are fine
- Beam line enhancements
- Need more training
- Manager tools are not yet mature
  - i.e.. File descriptor problem
- Role of LabView needs to be defined
- Tcl/Tk

7. Communications
- Applications don't get notification when server (FEC) goes down
- Connections are not reestablished upon server restart
- Orbit manager is now able to get reports from all BPM FECs

Controls

● **Possible delays in sending async messages**
- FEC real time issue

8 Generic Programs

● **All suffer from reboot problem**
● **PET and StartUp are fine**
● **GPM**
- Data correlation issues need to be addressed at many levels
● **Post Mortem**
- Work underway for PS PM
- What other requirements are there
● **Logging**
- Better plotting and setup
- Easier access to data (database)

9 Generic Programs (continued)

● **Virtual Scope**
- Viewed as potentially very useful
- Was not ready for PS usage
- Lots of testing to do
- Management of MADC and group 1 usage

10 Services

● **Alarms - system worked**
- Management and education needed
- Avalanche of alarms is a problem
- Alarm support needed in some ADOs
- PS Alarms might need special attention

11 Services (continued)

● **Save/Restore**
- S/R of support parameter needs work
- Education, S/R could be more useful
- System is much stronger than its use
● **Database**
- Controls inventory DB not integrated into configuration DB
- Not all "operational" DB on operational DB server
- Minor CNS/DB problem(s)

12 Development

● **Development tools**
- plot slowness,
- Dependencies resulted from release procedure breakdown
- training needed
● **Development Environment**
- old GCC, templates not right
- Slow linking
- Some debugger problems (database)

13 Support

● **Support**
- Record keeping/feedback not too good

- Contact OK
- Documentation and training needed
- Agnes gone, Jon as replacement

14 ☐ Power Supply
● Startup after reboot a big problem
● No good way to see and check system
- Alarms and PSStatus
● Error checking and reporting need broader scope and improvement
● Closer ties between the WFG manager and the WFGs
● More post mortem support needed
● Good PET support

15 ☐ MADC System
● Features are requested
- Float values to get rid of centiamps!
- Watching
- Group averaging
- Fresh data/stale data, data flow
- Data correlation
- Better PM support
● Overall management of settings and conversion values is weak
- Group 1 usage

16 ☐ Other Systems
● Details in the Controls session
● Vacuum - FEC bug fixed during run
● Cryo - fine, web plots useful
● BLM - very good, great manager and app, much used
- Losses scaled to beam current of interest
● BPM - Own session
● Other Instrumentation Systems

17 ☐

Action Items for December 99 Run - last updated 9/20/99

Area	Item	Priority	Time(wks)	Person(s)
Timestamps/Data Corr.	Finalize plan for providing Timestamps/DC across systems			rm
	Provide acquisition timestamps for target systems			
	Update Gpm to retrieve and use acquisition timestamps			
ADO Communications	Maintain connections through FEC reboots		8	
	Fix file descriptor problems		3	
	WFG manager timeouts when setting up asyncs (*)			
FEC Reliability	Develop procedures to track/understand FEC problems			
	Fix noise problems on PS FECs			
	Understand and try to fix FECs with memory problems			
	Understand and fix problems assoc. with permit timestamps			
	Some FECs (quench) take too long (7 min) to come up (*)			
Power Supplies	Improve the WFG startup			
	Errors - glitches, statuses to PSStatus, WFG manager			
	System wide diagnostics for testing WFGs and MADCs			
	Learn more about FEC to Modicon to node card communication			
	More Input from PS group			
	Better control, MADC like, of data from the WFG output buffer			
	PLC - sometimes commands don't get there, readbk not received (*)			
	Testing and system integration (*)			
	Begin process of taking over WFG manager (*)			
	PSStatus - add wireup info. to allow for more comparisons (*)			
	Review/change PS MADC update rate (1s or 5s) (*)			
	Continuing problems with magnet (ATR) manager (*)			
Post Mortem	Get more input from commissioners on needs/timelines		1	jl
	Create SDDS tools for FECs and make available		4	sn
	Generic PM display tools and application - target MADCs, WFGs		8	jl,td
	PS - automate storage and restart, perhaps with permit reset (*)			
Beam Position Monitors	Configuration issues			bo
	ADO changes to allow dynamic switching from service to working mode			bo
	Testing and system integration(*)			
Beam Loss Monitors	Field-test multibunch support		1	td
	Allow optional referencing to beam current		2	td
	Understand/Document setup of BLMs and Pat's scripts (*)			
Logging System	Create/maintain database of logged data files		2	kj
	New UI to logged data files		1	kj
	New plotting display of logged data		6	kj
	More advertising and training		1	kj
Alarm System	Get operations more involved in RHIC alarm management			
	Get all FECs up to proper release level			
	Begin review of systems and ados. Consider enabling more alarms			
	Decide on Power Supply alarm mechanisms (role of PSStatus?)			
	Review sources of alarm floods. Consider prevention mechanisms			
	Restore pet popup to the AlarmDisplay program			

Area	Item	Priority	Time(wks)	Person(s)
MADCs	Configure all 64 group 1 madcCh with aliases			
	System wide management tools or application			
	Better Post Mortem support			
	Data correlation support in ADO			
	Internals - code to driver			
	Decide and maybe redo data flow			
	Decide on functionality			
	Upgrade memory on MADC boards? (*)			
Console Hardware	Fix and re-deploy sun65			
	Purchase new X server for power supply group			
	One MCR console to get additional 2-head xterminal			
	sun68 overloaded? (*)			
Generic Applications	Gpm - use of data timestamps, improved data correlation			
	pet - view/edit ADO desc, Gpm-style strip charts, round-off probs (*)	2		
	VirtualScope - field testing, save/load data, usability enhancements			sb
	Remote scope avail. in field for Brennan (*)			
Save/Restore System	Provide more useful archive comparisons	2		jl
	Implement S/R of ADO support properties	3		jl
	Advertising and training	1		jl
Database Management	Move inventory database to Sybase and provide entry/viewing tool			
	Change adoInst table to allow for larger ADO class names, desc.			
	Look into CNS problem			
Vacuum, WCM, DCCT	Vacuum - add cryo VJR gauges and 4th processor			rl
	DCCT - add mechanism to automatically rezero			rl
	WCM - add second scope, improve speed of plotting data			rl
Diagnostic Support	Better documentation to help users resolve problems on their own			jl
	Continued training of support personnel on RHIC systems			jl
	Improved trouble logging system			jl
	Procedure for MCR to diagnose FEC probs and reboot (*)			
	Give operators some way to kill runaway processes (*)			
	Extract and make available useful messages in notif log (*)			
Experiment Support	Write FAQ document for experimenters			sn
App. Dev. Tools	Beamline display enhancements	2		sn
	Advertising and Training on newer tools	1		td
	Improved documentation			
App. Dev. Environ.	Handle shared object versions better	1		td,kj
	Reduce link times with new RAID system			
Permit System	Finish and test ADO changes made during the last run			bo

(*) items are new since RHIC retreat